REMARKS

I. Summary of the Office Action

Claims 1-22 are pending in the application. Claims 1, 10, 14 and 20 are the only independent claims. The Examiner has rejected claim 1 under 35 U.S.C. §103(a), as being unpatentable over U.S. Pub. No. US 2003/0016770 (Trans) in view of U.S. Patent No. 6,404,831 (Melas) and in further view of U.S. Patent No. 5,680,451 (Betts).

Claims 2, 8, 9, 11 13, 15, 19 and 22 have been rejected under 35 U.S.C. § 112 as being indefinite.

II. Summary of this Reply

Claims 2, 11 and 15 have been amended to now clearly recite that a "substantially maximal energy" is derived from the rotation of the first L+1 coefficients. Support for this feature is found in the Specification at page 7, lines 8-10.

Claims 8, 9, 13, 19 and 22 have been amended to now define each of the terms that appear in the equation.

It is believed that the rejections under Section 112, second paragraph, have been properly resolved, and their withdrawal is therefore respectfully requested.

III. Prior Art References

The Trans Prior Art Reference

Trans discloses a channel equalization system and method for use in wireline and wireless systems. As recited in Trans, his invention "represents the collection of state-of-the art FIR

filtering schemes in multichannel signal coding (advance adaptive equalization) that enhance the channel Inter-symbol Interference (ISI) and Cross Talk noise suppression for wireline and Multipath Noise and Fading Suppression for wireless applications" (Paragraph 0015).

The Melas Prior Art Reference

Melas relates to a digital filter detector used in a data detection device. In particular, Melas submits that his data detection channel has "improved detection reliability and better immunity to signal dropout and noise ... [and] has reduced data redundancy" (Melas; col. 1, lines 45-47). The device includes a preamp/filter, a sample quantizer, an equalizer, a trimming recovery circuit and a digital detection filter.

The Betts Prior Art Reference

Betts relates to a listener echo cancellation method/device for use with modems. "Cancellation of the listener echo is achieved by coupling to the listener echo canceller of the receiving modem the phase corrected adaptive equalizer output signal" (Abstract).

IV. The Present Invention

The present invention, as defined by independent claim 1, relates to a method of generating a shortening channel impulse response in a discrete multitone transceiver. The method includes determining an impulse response of a channel, the impulse response having a plurality of coefficients corresponding to a length of a symbol. The method further includes rotating these impulse response coefficients to a rotation that decreases inter-symbol interference (ISI).

The rotation step and the resulting ISI noise computations are described in general in the specification, inter alia, at page 8 lines 3-20, where it is noted that:

> ... we calculate the ISI using the rotation as described above as well as several immediately surrounding rotations of the coefficients and select the rotation that yields the lowest ISI value. The calculations are performed in the frequency domain. Specifically, we multiply the average energy of the transmitted symbol (which is a constant) by the Fast Fourier Transform (FFT) of the ISI value caused by the imperfect shortening channel impulse response coefficients. We do this for various rotations including and immediately surrounding the rotation determined above and take the rotation that yields the smallest value (page 8, lines 11-20).

An example of how this method is applied appears on page 19 of the specification. In this example, the rotation calculation defined by Equation 20 (appearing on page 17 of the specification) is applied seven times to determine the smallest ISI (i.e., TN in Equation 20) for the applicable impulse response coefficients.

V. Response to 103 Rejection

An important feature of claim 1 is the step of "rotating said impulse response coefficients to a rotation that decreases inter-symbol interference". This step of rotating has been defined in the specification to be a mathematical calculation to yield an ISI value, an example of which being Equation 20.

In paragraph 2 of the Office Action, the Examiner acknowledges that neither Trans nor Melas teaches rotating the impulse response coefficients. He then points to Betts for teaching this feature. In particular, the Examiner points to multipliers 125 and 129 for performing this function. However, Betts defines multipliers 125 and 129 as both performing an angle of rotation e^{jphi} where

this angle of rotation e^{jphi} is supplied from the far echo canceller PLL (ref. Betts; col. 2, lines 60-63 and col. 3, lines 1-2). Betts' use of these angular rotations, as noted in Paragraph 2 of the Office Action, results in "substantially the listener echo" signal (col. 3, lines 3-4). Such a rotation operation is far different from the rotation operation of claim 1 in which a measure of inter-symbol interference (ISI) is obtained.

Betts neither teaches or suggests the feature of claim 1 where a rotation operation, as defined in the application's specification, is performed on the impulse response coefficients. Further, this feature is neither taught nor suggested by the Trans or Melas references. For at least these reasons, claim 1 is patentable over the combination of Trans, Melas and Betts.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant believes claims 1-22 to be patentable and the application to be in condition for allowance, and respectfully requests issuance of a Notice of Allowance. If any issues remain, the undersigned requests a telephone interview prior to the issuance of an action.

Respectfully submitted,

Yhean-Sen Lai

By: 

Thomas J. Onka, Reg. No. 42,053
Date: 7/27/05

Synnestvedt Lechner & Woodbridge LLP
P.O. Box 592
Princeton, NJ 08542
609-924-3773 phone
609-924-1811 fax